TWO NEW SPECIES OF *VALERIANA* (VALERIANACEAE) FROM CERRO DE TEOTEPEC, GUERRERO, MÉXICO

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ABSTRACT

Two new species, **Valeriana bryophila** and **Valeriana gallinae**, from Cerro de Teotepec in Guerrero, are described. *Valeriana gallinae* is closely related to *V. pilosiuscula*, differing most obviously in having fruits that are glabrous and lanceolate, rather than hirsute or pilose and ovate. The relationships of *V. bryophila* are less obvious; characters of the inflorescence and fruits suggest a possible relationship with *V. pulchella*, a species that is perennial rather than biennial, and in which the basal leaves are compound rather than simple.

RESUMEN

Se describen dos especies nuevas de Cerro Teotepec, Guerrero, México. *Valeriana gallinae* asemeja a *V. pilosiuscula* Mart. & Gal., pero se distingue por frutos lanceolados y glabros en lugar de frutos ovados y pilosos o hirsutos. Las relaciones de *V. bryophila* son ms enigmticas; parece superficialimente a *V. pulchella*, una especie perene con hojas compuesta. Al obstante la especie nueva es bianual y presenta hojas basales simples.

During the course of field work for a revisionary study of the *Valeriana* of México and Central America (Barrie 1989), two new species were discovered in the fir forest on Cerro de Teotepec in the state of Guerrero, México.

Cerro de Teotepec (17°27′N; 100°10′W; elevation 3550 m) is the highest peak in the southern Pacific coastal state of Guerrero. Elevations between 2800 and 3300 m are dominated by *Abies religiosa* (Kunth) Schlecht. & Cham. At the highest elevations, the firs are replaced by *Pinus hartwegii* Lindl.

According to Rzedowski (1978), fir forests in México occur as insular patches of vegetation on steep slopes at elevations of 2400 – 3600 m. They require cool, moist conditions with upwards of 1000 mm of precipitation per year and dry seasons of less than four months duration. The fir forest of Cerro de Teotepec is quite isolated. While there may be scattered small stands closer, the nearest fir forest of appreciable size grows in the mountains north of Cuernavaca, Morelos, some 225 kilometers distant.

The two species described in this paper were discovered growing in the fir forest near the road that runs east from the village of Puerto del Gallo

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towards Chilpancingo. They dropped out when the road descended into the pine-oak-alder forest below 2800 m. Whether they occur above the fir forest, in the *Pinus hartwegii* zone, is unknown.

Valeriana **bryophila** Barrie, sp. nov. Fig. 1.

Herba biennis, gynodioecia, ad 30 – 60 cm alta; glabra vel glabrata; purpureo-maculata. *Folia inferiora simplicia, ad 3.5 – 10.0 cm longa; petioli gracili, 1.7 – 8.5 cm longi; laminae reniformis vel late ovatae; folia superiora plerumque ternata, pinnata raro; 1.6 – 7.5 cm longa. Inflorescentia apicalis, dichotoma.* Bracteae lineares vel oblancolatae, 3.0 – 10.0 (20.0) mm longae, 0.4 – 1.0 (4.0) mm latae; basis descreta vel connata. Bracteolae fructus aequantes quam paulo superantes; linearae, bases connates. Calyx 9 – 11-fidus; limbi plumosi, 2.0 – 2.5 longi in fructu. Corolla florum hermaphroditicorum 3.5 – 4.8 mm longa; corolla florum femineorum 1.6 – 2.2 mm longa. Stamina et stylus exserti. Cypsela 1.8 – 2.8 mm longa, 0.8 – 1.2 mm lata; ovata, glabra. *Habitat in tegibus muscorum fonticulisque.*

Biennial, gynodioecious herbs, 30 – 60 cm tall, stem, leaves, and inflorescence purple-maculate. ROOT tuberous; simple or bifurcate; 1.5 – 4.0 cm long, 1.0 – 1.5 cm wide; fusiform. STEM 15 – 45 (85) cm long, 2 – 3 mm wide; glabrous, or puberulent at the nodes only. LEAVES basal and cauline; the basal and lowest pairs of cauline leaves simple, long-petiolate; 3.5 – 10.0 (22.5) cm long; the petioles slender, 1.7 – 8.5 (20.0) cm long, 1 mm wide, base free or connate; the blades 0.7 – 2.5 cm long, 0.8 – 4.3 cm wide, ovate to oblate or reniform, base cordate, less commonly cuneate or truncate, apex rounded to acute, margin irregularly dentate or lobed; glabrous; the upper cauline leaves ternate, rarely pinnate, 1.6 – 7.5 cm long; the petiole 0.5 – 4.0 cm long, 1.0 mm wide, base connate; blades 1.2 – 5.2 cm long, 1.4 – 2.8 cm wide, elliptic to deltoid; the terminal leaflet 11 – 30 mm long, 5 – 15 mm wide, the lateral leaflets smaller, 6 – 17 mm long, 1 – 8 mm wide, elliptic to ovate, base cuneate, apex acute, margins and vestiture as in simple leaves. INFLORESCENCE terminal, often with lateral inflorescences arising from the lowest pair of leaf nodes; dichotomous throughout; in flower 2.5 – 10.0 cm long, 3.0 – 10.0 cm wide; in fruit 10 – 16 cm long, 10 – 14 cm wide; glabrous, or puberulent at the nodes only. BRACTS 3 – 10 (20) mm long, 0.4 – 1.0 (4.0) mm wide; linear to oblanceolate; base free or connate; apex acute; margins entire. BRACTLETS equal to or slightly longer than mature fruits, 1.9 – 3.0 mm long, 0.2 – 1.0 mm wide, linear, base connate, apex acute, margin scarious. CALYX 9 – 11-fid, the plumose segments 2.0 – 2.5 mm long on the mature fruit. COROLLA white to pink; infundibular; pilose within, glabrous without; corollas of hermaphroditic flowers 3.5 – 4.8 mm long; the tube 2.2 – 3.2 mm long, 0.9 – 1.2 mm wide; the lobes 1.3 – 1.6 mm long, 0.7 – 1.4 mm wide; apices rounded;

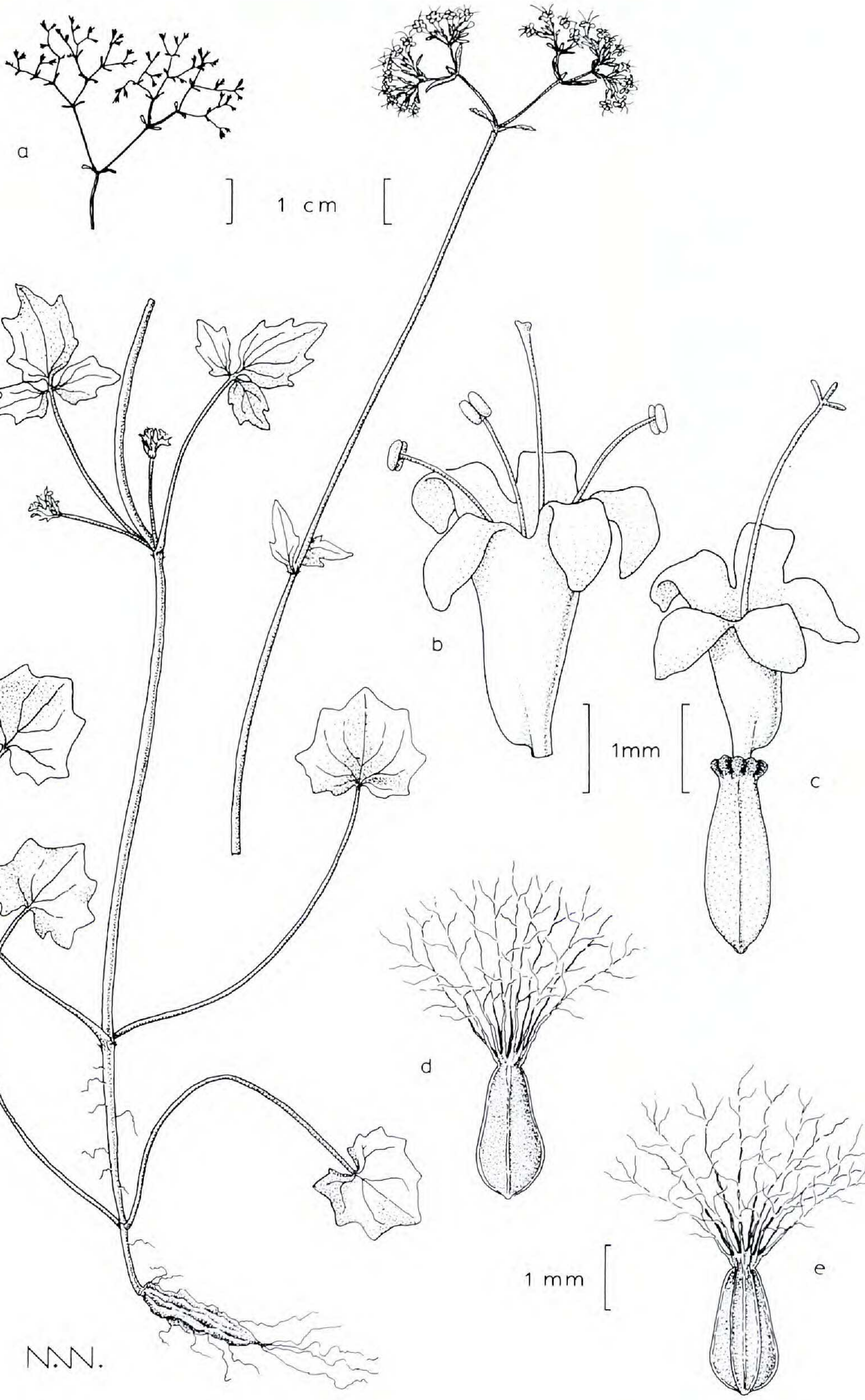

FIG. 1. *Valeriana bryophila*, from holotype. a. terminal branchlet of infructescence; b. corolla, anthers and immature style, hermaphroditic flower; c. female flower; d. cypsela, adaxaial surface; e. cypsela, abaxial surface.

the tube of female flowers 1.6 – 2.2 mm long, 0.6 – 1.8 mm wide; the lobes 0.7 – 1.2 mm long, 0.5 – 1.0 mm wid; apices rounded. STAMENS strongly exserted, 2.5 – 3.7 mm long, the filaments 2.2 – 3.4 mm long, adnate to the tube for 1/2 – 3/4 of its length; anthers 0.5 – 0.7 mm long. STYLE of hermaphrodites 4.4 – 5.2 mm long; that of females 3.8 – 4.5 mm; stigmas linear, 0.2 mm long. CYPSELA green to purple-maculate; 1.8 – 2.8 mm long, 0.8 – 1.2 mm wide; ovate; veins simple, the abaxial lateral veins parallel with the margin; glabrous. Chromosome number unknown.

PHENOLOGY: Flowering and fruiting Aug-Dec.

DISTRIBUTION: In wet seeps and moss mats, in *Abies* forest, Cerro de Teotepec, 2800 – 3400 m. Also on Cerro Alquitrán, south of Chilpancingo, Guerrero.

TYPE: MEXICO. GUERREROm E of Puerto del Gallo on the road to Filo del Caballo, 24 Aug 1984, *Fred R. Barrie 954* (HOLOTYPE: TEX; ISOTYPES: MEXU, MICH, US).

Other specimens examined: MEXICO. GUERRERO: 14.5 km E of Puerto del Gallo on the road to Filo de Caballo, 23 Nov 1983, *Barrie 694* (MEXU, TEX); 19 km E of Puerto del Gallo, 23 Nov 1983, *Barrie 700* (MEXU, TEX); 17 km E of Puerto del Gallo, 24 Aug 1984, *Barrie 956* (MEXU, TEX); steep slopes near summit of Cerro de Teotepec, 12 Nov 1973, *Breedlove 36076* (MEXU); Cerro de Teotepec, 5 Dec 1963, *Feddema 2928* (MICH); plantas cultivada en la ciudad de México, procedentes de la cumbre del Cerro Alquitrán, 28 Jun 1967, *anonymous, s.n.* (ENCB).

The combination of simple, long-petiolate basal and lower cauline leaves with the upper leaves compound, ovate fruits, biennial habit and inflorescence which is dichotomously branched throughout easily distinguishes *V. bryophila* from any other Mexican valerian. It is most similar in appearance to *V. pulchella* Mart. & Gal., a perennial herb found in the fir forests of the Sierra de Juare'z and Sierra San Felipe of northern Oaxaca. *Valeriana pulchella* has compound basal leaves and roots which are 6 – 12 cm long and commonly in fascicles of 3 – 5 lobes. The only other valerian in Guerrero with simple leaves is the widespread *V. urticifolia* Kunth, which is also biennial. In that species, however, all of the leaves are simple, short-petiolate and dentate rather than lobed, the fruits are more elliptic than ovate, with a reinforced margin that is noticably thicker than the body, and the first order of branching in the inflorescence is decussate, not dichotomous.

Valeriana bryophila is apparently restricted to wet seeps and moss mats with continuously running water. The type itself was collected from a moss mat growing over bare, gently sloping granitic rock which had water flowing along its surface. My other collections were from moss-covered seeps with rich, black soil. Under these conditions this species grows in dense populations of several hundred individuals.

With the exception of one specimen grown in cultivation in Mexico City, all of the specimens cited above were collected in the fir zone on Cerro de Teotepec. The cultivated specimen was grown from material collected on Cerro Alquitrán, south of Chilpancingo and 60 km east of Teotepec. It may be that *V. bryophila* occurs on several of the peaks in this section of the Sierra Madre del Sur, where local conditions are suitable for it.

VALERIANA **gallinae** Barrie sp. nov. Fig. 2.

Valeriana pilosiuscula Martens et Galeotti affinis, a qua imprimis differt lobis corollae tubo 3 – 4-plo breviora et fructibus glabris et lancolatis vel anguste ellipticis.

Erect, perennial, gynodioecious herb to 1 m tall. ROOT tuberous, fusiform, simple or fasciculate; the lobes 5 – 20 cm long, 1 – 3 cm wide; reproducing vegetatively by fragmentation of the fascicles. STEM green to purple-maculate; 60 – 80 cm tall, 5 – 13 mm wide; glabrous or hirtellous distally. LEAVES basal and cauline, imparipinnate, 6 – 31 cm long; the petiole free or connate, 1 – 18 cm long, 1 – 4 mm wide, hirtellous above, the hairs 0.2 – 0.3 mm long; the blade 4.5 – 18.0 cm long, 4.0 – 12.0 cm wide; glabrous or with scattered hairs along the veins abaxially; the terminal leaflet larger than the laterals, 3.5 – 8.0 cm long, 1.5 – 5.8 cm wide; ovate to widely depressed-ovate or oblate, base truncate or cuneate, apex rounded to acute; the lateral leaflets in 1 – 3 pairs, disposed oppositely or subequally along the rachis and increasing in size distally; 1.0 – 6.9 cm long, 0.8 – 4.5 cm wide; elliptic to ovate or broadly ovate; base cuneate; apex acute; margins crenate to dentate; surfaces glabrous. INFLORESCENCE an aggregate dichasium; 12 – 24 cm long, 9 – 13 cm wide in flower and fruit; lateral branches ascending; 3 – 4 pairs; 2.5 – 11 cm long; terminal branching scorpioid, bearing 2 – 4 flowers or fruits; branches puberulent, pubescent to velutinous at the nodes. BRACTS green to purple-maculate; 2 – 20 mm long, 0.5 – 3 mm wide; tri-lobed or lanceolate; base free or connate; apex acute; margin entire to scarious. BRACTLETS green to purple-maculate; 1/3 to 1/2 as long as the mature fruits; 1.5 – 2.1 mm long, 0.4 – 0.6 mm wide, ovate to elliptic, base connate, apex acute to acuminate, margin scarious. CALYX 11 – 13-fid, the segments 3.5 – 6.5 mm long at maturity. COROLLA white to pale pink; infundibular; gibbous; glabrous without, pilose, the hairs 0.3 – 0.5 mm long, within; corolla of hermaphrodites 4.5 – 6.2 mm long, the tube 3.5 – 4.6 mm long, 1.0 – 1.6 mm wide; the lobes 1.0 – 1.6 mm long, 0.5 – 1.2 mm wide, apices rounded; corolla of females 2.4 – 2.6 mm long, the tube 1.8 – 2.0 mm long, 0.8 – 1.2 mm wide; the lobes 0.5 – 0.6 mm long, 0.5 – 0.6 mm wide, apices rounded. STAMENS exserted, 3.2 – 4.0 mm long; the filaments 2.8 – 3.5 mm long; adnate 2/

3 – 4/5 length of the tube; anthers 0.7 – 0.9 mm long. STYLE of hermaphrodites 5.6 – 6.8 mm long; that of females 3.5 – 4.2 mm long; stigmas linear, 0.2 mm long. CYPSELA green or purple-maculate, 2.8 – 4.0 mm long, 1.0 – 1.3 mm wide; lanceolate to narrowly elliptic; veins simple; the abaxial lateral veins parallel to midvein, margin slightly revolute; glabrous throughout. Chromosome number, n = 16 (*Barrie 693*).

PHENOLOGY: Flowering and fruiting Jul-Dec.

DISTRIBUTION: Shallow soil in fractured rock surfaces, *Abies* forest, Cerro de Teotepec, 2800 – 3000 m.

TYPE: MEXICO. GUERRERO: 5 km E of Puerto del Gallo on the road to Filo del Caballo, 24 Aug 1984, *Fred R. Barrie 951* (HOLOTYPE: TEX; ISOTYPES: ENCB, MEXU, MICH, UC, US).

Other specimens examined: 5 km E of Puerto del Gallo on the road to Filo de Caballo, 23 Nov 1983, *Barrie 693* (MEXU, TEX); 30 km E of Puerto del Gallo, 23 Nov 1983, *Barrie 703* (MEXU, TEX); Teotepec, 16 Jul 1939, *Hinton 14443* (ENCB, F, GH, NY, UC, US).

The epithet refers to the village of Puerto del Gallo, near which the type was collected.

This species is closely related to *Valeriana pilosiuscula* Mart. & Gal., from which it differs most obviously in having lanceolate to narrowly elliptic, glabrous fruits as opposed to ovate and pilose or hirsute. In *V. gallinae*, the margins of the fruit are revolute, with the marginal veins appearing to be on the adaxial surface. Unlike *Valerianella*, where genetically-controlled, infrapopulational fruit polymorphism is common (Eggars Ware 1983), fruit morphology in species of *Valeriana* is fairly stable and significant differences are usually reliable indicators of divergence. In this species, the fruit characters are associated with differences in characters of the leaves and flowers. The blades of the leaves in *V. gallinae* are glabrous, or rarely with scattered hairs along the veins below. In V. pilosiuscula the leaves commonly have scattered hairs, particularly on the upper surface. Although the overall length of the corolla in the two species is similar, *V. gallinae* has narrow tubes with lobes that are one-fifth to one-fourth of the corolla length. The tubes of *V. pilosiuscula* expand more distally, and the lobes are one-third to one-half of the corolla length. Both species reproduce vegetatively by fragmentation of the rootstocks.

Valeriana gallinae grows in shallow soil in fractured rock faces and rock falls. The type collection was made in a rock fall that appeared to be flooded periodically. While it can be found on sites within a few meters of *V. bryophila*, it does not grow in the saturated soils to which that species is restricted. In contrast to the large populations of the former, *V. gallinae* grows in stands of 2 – 8 individuals, any or all of which may be ramets from an original mother plant.

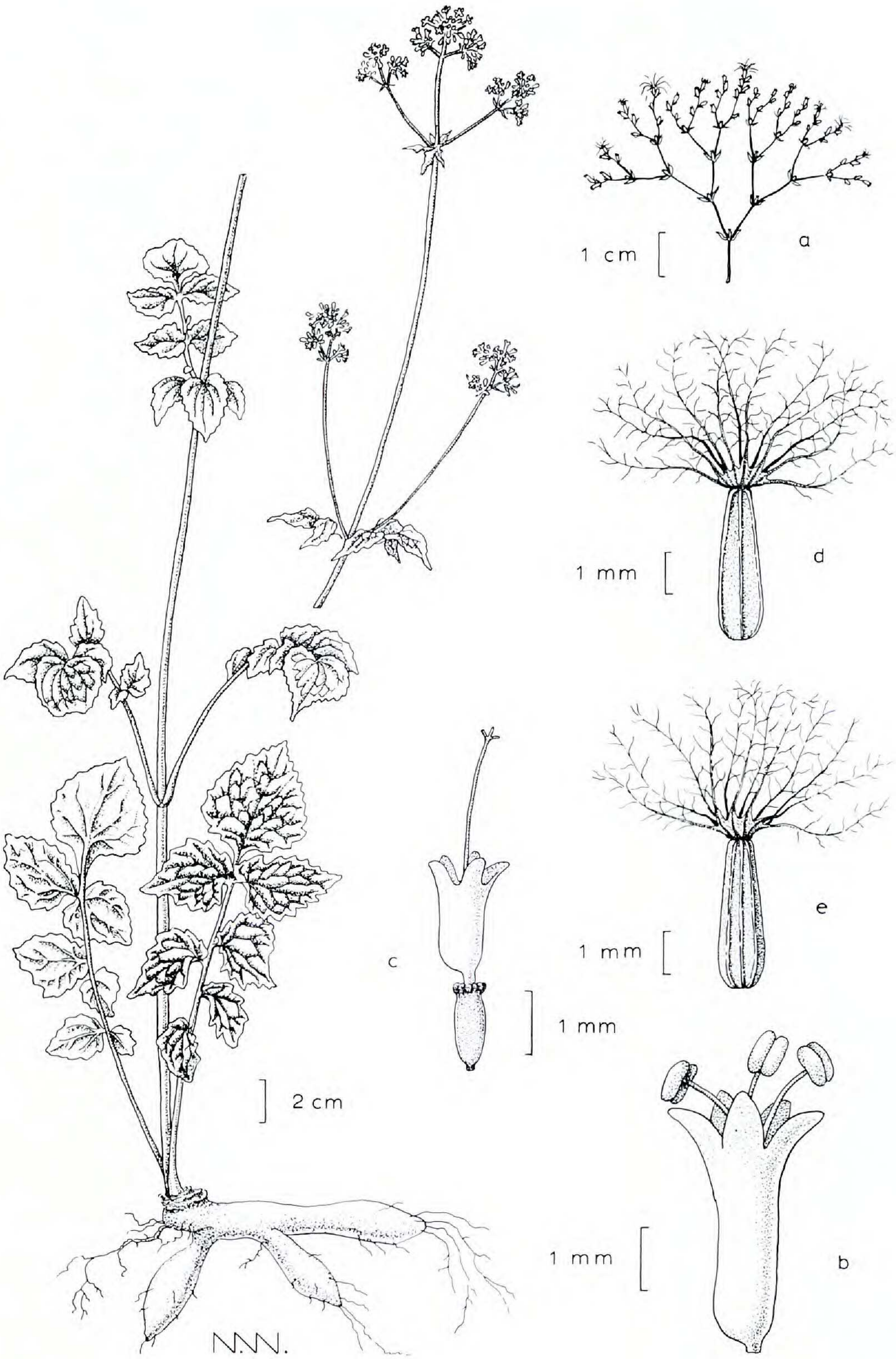

FIG. 2. *Valeriana gallinae*, from greenhouse specimen collected at the type locality. a. Terminal branchlet of infructescence (from isotype); b. corolla, hermaphroditic flower (from isotype); c. female flower (from holotype); d. cypsela (from holotype), adaxial surface; e. cypsela, abaxial surface.

Both *V. gallinae* and *V. pilosiuscula* are related to *V. densiflora* Benth. In his revision of the Valeriana of North America, Meyer (1951) cited Hinton 14443 under *V. densiflora* var. *densiflora*; *V. pilosiuscula* he treated as a synonym of it. However, the three taxa are distinct, distinguished by several morphological characters as well as their habitat requirements. *Valeriana densiflora* and *V. pilosiuscula* share the characters of ovate, pubescent to velutinous fruits. *Valeriana densiflora* has corollas of similar shape and proportion to those of *V. pilosiuscula*, but they are larger, those of perfect flowers being 5 – 6 mm long vs. 3 – 5 mm in the latter species, while those of pistillate flowers are 3 – 4 mm vs 2 – 3 mm long. *Valeriana densiflora* is more diminutive than either of the other species, not exceeding 50 cm in height. Unlike both *V. gallinae* and V. pilosiuscula, it lacks basal leaves and the size differential between the terminal and lateral leaflets of the cauline leaves is much greater.

Valeriana pilosiuscula grows in the pine-oak forests, at elevations of 1200 – 2800 m, from Durango to Puebla and Guerrero. *Valeriana densiflora* is restricted to the fir and *Pinus hartwegii* zones on the mountains surrounding the southern half of the Valley of Mexico, as well as locally in similar habitats on peaks in western Mexico state and eastern Michoacan, and replaces the former where the pine-oak and fir zones meet. This stratification of the distribution of the two species is similar to that which occurs between *V. pilosiuscula* and *V. gallinae* in Guererro. Although *V. gallinae* has not been collected other than on Cerro de Teotepec, it may be that, like *V. bryophila*, it will be found on other peaks in the region, if the local conditions are suitable.

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